LandCART: A Bureau of Land Management Platform for Dryland Decisions
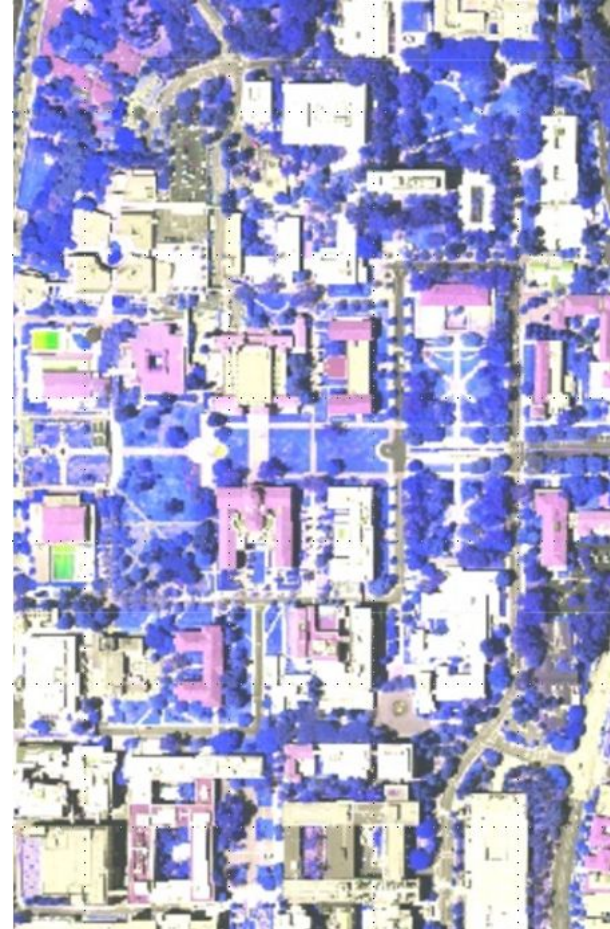
Bo Zhou
Greg S. Okin
University of California, Los Angeles

Project overview

- RFP
  - Applied Sciences: Ecological Forecasting
  - Remote Sensing as a Catalyst for Large-scale Conservation

- Proposers
  - UCLA
  - US Geological Survey (USGS)

- Partner
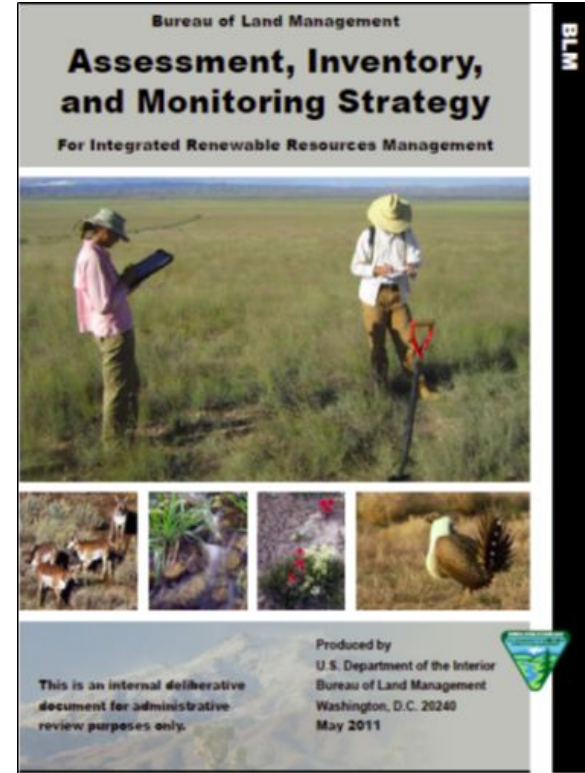 - Bureau of Land Management (BLM)

- BLM manages 247.3 million acres of federal land
- BLM Lands are both working lands and native habitat
- We are developing tools to help make actionable management decisions

- A tool that will allow BLM <u>field offices</u> to make <u>legally-defensible</u> land management decisions
  - LandCART will be available publicly on the cloud
    - Aids <u>sustainability</u> after NASA funding ends
    - Makes updates easy
  - LandCART will allow download of results and predictors for the NEPA Administrative Record

- Our Working Model
  - BLM is the client, UCLA/USGS are the contractor.

Sources of training data

- Assessment, Inventory, and Monitoring strategy (AIM) was developed as a set of standards for field observations to allow land managers to gather data in a consistent and efficient manner, to be used at the field office, regional and national level
  - AIM data focused on project based targeted area sampling
  - Landscape Monitoring Framework (LMF) data focused on a stratified sampling strategy for national assessments
- Natural Resource Conservation Service (NRCS) as part of the USDA has developed a similar sampling strategy under the National Resource Inventory (NRI) program
  - NRI data were collected using consistent method with the AIM strategy which allows for direct data integration
  - NRI data were collected on non federal land so the location information is access controlled

Bureau of Land Management
Assessment, Inventory, and Monitoring Strategy
For Integrated Renewable Resources Management

BLM

This is an internal deliberative document for administrative review purposes only.

Produced by
U.S. Department of the Interior
Bureau of Land Management
Washington, D.C. 20240
May 2011

Source: http://aim.landscapetoolbox.org/, https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/

LandCART Parameters

- Different Types of Users
  - Field Office
  - Power User

- <u>Choose Your Own Adventure</u> Approach using Multiple Earth Engine Apps, like:
  - Cover Tool: Making a map and getting basic statistics (mean, SD .etc)
  - Cover Change Tool: Comparing the same area at different times, with statistical testing (K-S)
  - Time Series Tool: generate long time series with statistical testing (Sen's slope)

- Scientifically sound in using spatially and temporally dispersed field data
  - Useable
  - Useful
  - Used

550 Miles

Machine Learning Models
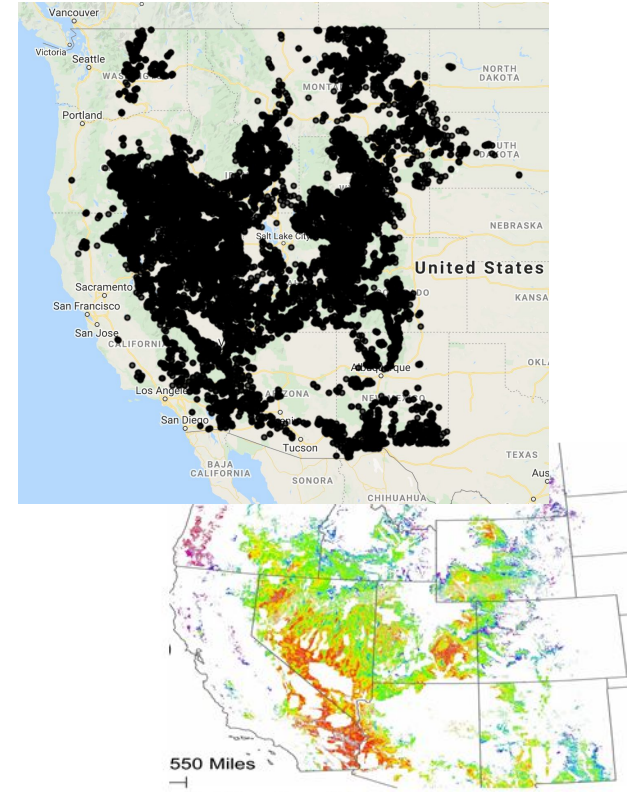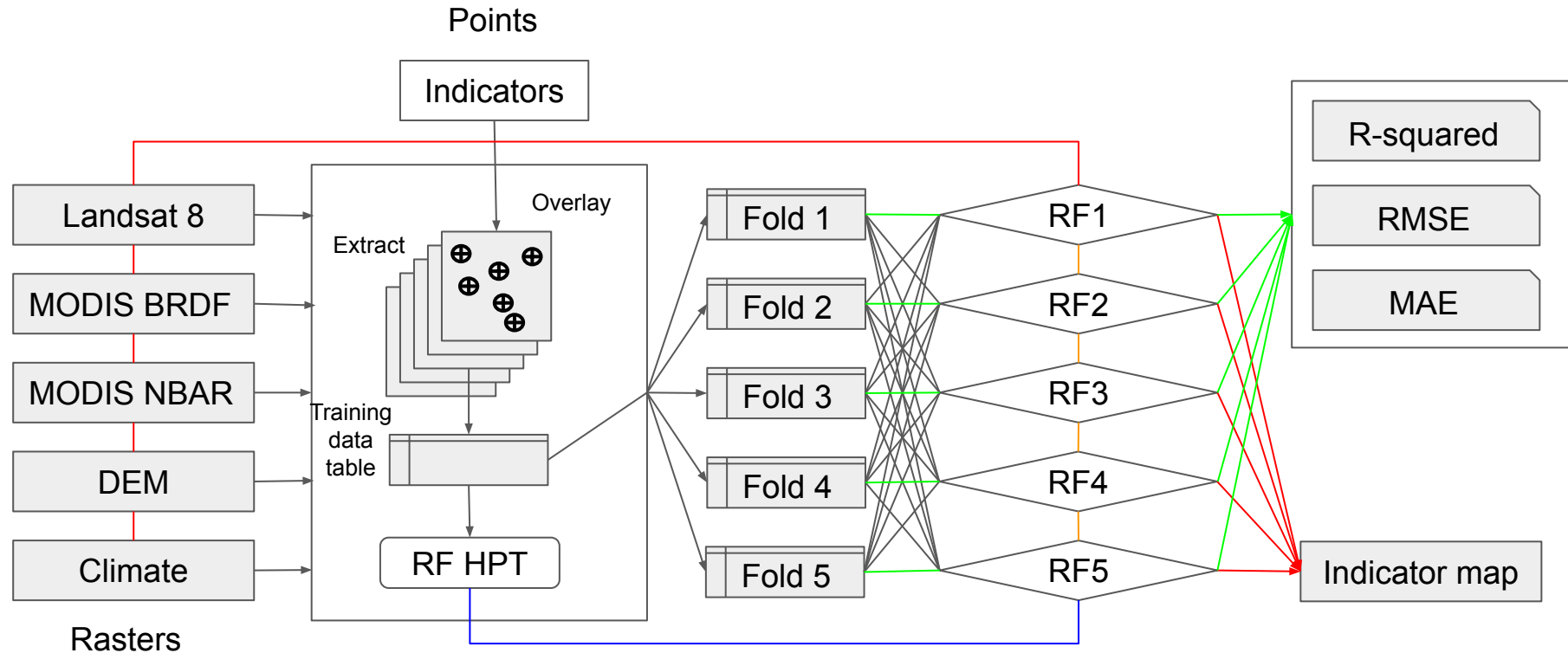
- Convolutional Neural Networks
  - More complicated to set up but only showed marginal improvement compared to RF with the current training set
  - Predictions using CNN models deployed on AI Platform are not free
  - May revisit when more training data are available and cost lowered

We would like to thank Mike Duniway from USGS, Chris Cole, Sam Litschert, John Liddle and Shannon Savage from BLM who have contributed tremendously to this project! We would also like to thank Cindy Schmidt and Woody Turner from NASA for granting us the opportunity to work on this project!

Please go to Landcart.org to follow along!